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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Appl. No.	: 09/772,477
Appellant(s)	: HOLTSLAG, Antonius H., et al.
Filed	: 29 January 2001
Title	: METHOD OF DISPLAYING IMAGES ON A MATRIX DISPLAY DEVICE
TC/A.U.	: 2675
Examiner	: NELSON, Alecia Diane
Atty. Docket	: PHNL 000025

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On: April 5, 2004

By: John C Fox

APPELLANT'S APPEAL BRIEF

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BRIEF OF APPELLANT

This Brief of Appellant follows a Notice of Appeal, dated 5 February 2004, appealing the final rejection of claims 1-8 of the application, the final rejection dated 6 November 2003. All requisite fees set forth in 37 CFR 1.17(c) for this Brief are hereby authorized to be charged to Deposit Account No. 501850.

REAL PARTY IN INTEREST

The real party in interest in this appeal is the assignee of all rights in and to the subject application, Koninklijke Philips Electronics, N.V. of The Netherlands.

RELATED APPEALS AND INTERFERENCES

To the best of the knowledge of the undersigned, no other appeals or interferences are known to Appellants, Appellants' legal representatives, or assignee which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

STATUS OF CLAIMS

Of the original claims 1-8, claim 1 was amended. Claims 1-8 stand finally rejected as set forth in the final Office Action dated 6 November 2003, and are the subject of this appeal.

STATUS OF AMENDMENTS

No amendment to the specification and/or claims was offered subsequent to the final Office action. All amendments have been entered.

SUMMARY OF THE INVENTION

The invention relates to a method of displaying images on a subfield driven matrix display device. (Specification; page 1, lines 2, 3)

The invention also relates to a display apparatus comprising a subfield driven display device for displaying successive image frames or fields on display lines. (Claim 8)

The invention is applicable, *inter alia*, to plasma display panels (PDPs), plasma-addressed liquid crystal panels (PALCs), liquid crystal displays (LCDs), Polymer LED (PolyLEDs), Electroluminescent (EL) used for personal computers, television sets, etc. (Specification; page 1, lines 4-6)

As shown in Fig. 1, a matrix display panel such as a plasma display panel comprises a set of common electrodes (Ce) known as data electrodes extending in the column direction and a set of address electrodes (Ae) known as scanning electrodes extending in the row direction. (Specification; page 1, lines 9-11; page 3, lines 24-26)

One method of displaying luminance levels in such a plasma display panel is known from EP 0 890 941 (Wani). In this method, a field comprises for example 8 subfields. Six such subfields are represented by the timing diagram in Fig. 2, in which each subfield has an erase period (E) for conditioning the panel, an address period (A) for priming the cells that should be lit during sustaining, and a sustain period (S) during which the actual light is generated. The sustain period (S) of each subfield is given, for example, a weight of 128, 64, 32, 16, 8, 4, 2, or 1 corresponding to an 8-bit digital signal (b7,b6,b5,b4,b3,b2,b1) and allowing to obtain 256

luminance levels. The total sustain period for one field should be as long as possible in order to obtain a high brightness. (Specification; page 1, lines 12-20; page 3, lines 26, 27)

The erase period (E) is rather short, say, 0.2 ms, i.e. 8 x 0.2 ms = 1.6 ms per field. The address period is about 3 µs per line. For a VGA display, comprising 480 display lines, the address period per subfield equals 480 X 3 µs = 1.5 ms. At 8 subfields per field, the total address period is therefore 12 ms. At a field rate of 60Hz (period = 16.6 ms), only 3 ms is left as the total sustain period per field. (Specification; page 1, lines 21-25)

The reduction of the address period is one of the main challenges in the design of a plasma display panel. (Specification; page 1, lines 26, 27)

Methods have been developed for reducing the address period, thereby increasing the sustain period. (Specification; page 1, lines 28, 29)

Two such methods are disclosed in EP-A-0 890 941. In these methods, the high-weight subfields b8,b7,b6,b5 are addressed for each display line, and the low-weight subfields b4,b3,b2,b1 are addressed for only part of the display lines. (Specification; page 2, lines 1-3)

In the first of these methods, the odd low-weight subfields b3,b1 are addressed to odd-numbered scanning lines and the even low-weight subfields b4,b2 are addressed to even-numbered scanning lines. (Specification; page 2, lines 4-6)

In the second of these methods, two adjacent scanning electrodes are addressed simultaneously with the same data (quasi-whole scanning). (Specification; page 2, lines 7, 8)

Both of these methods allow a reduction of the address period by a factor of two for doubled subfields, or of

ISSUES

The issues on appeal are:

1. Are claims 1, 2, 3, 5 and 8 unpatentable under 35 USC 103(a) over Wani (EP 0 890 941)(herein 'Wani') in view of Kida et al. (US 6,018,329)(herein 'Kida')?

2. Is claim 4 unpatentable under 35 USC 103(a) over Wani in view of Kida and further in view of Huang (US 20010045924)(herein 'Huang')?

3. Is claim 6 unpatentable under 35 USC 103(a) over Wani in view of Kida and further in view of Nagai (US 6,448,947)(herein 'Nagai')?

4. Is claim 7 unpatentable under 35 USC 103(a) over Wani in view of Kida and further in view of Prince et al. (US 5,508,716)(herein 'Prince')?

GROUPING OF CLAIMS

Claims 1, 2, 3, 5 and 8 stand or fall together; claims 4, 6 and 7 each stand or fall alone.

ARGUMENT

1. Are claims 1, 2, 3, 5 and 8 unpatentable under 35 USC 103(a) over Wani in view of Kida?

Claims 1, 3, 5 and 8 are rejected under 35 USC 103(a) as being unpatentable over Wani (EP 0 890 941) in view of Kida.

Wani is cited and discussed by Appellant in the Specification, and is repeated in this Brief in the section SUMMARY OF THE INVENTION.

Wani teaches that the subfields representing the less significant bits, referred to as the lower four bits, are displayed by interlace scanning. This is a well known term of art, which means that every other line is scanned for one subfield, and the remaining lines are scanned for the next subfield. This interlaced scanning is explained by Appellant in terms of the odd low weight subfields b3, b1 being addressed to odd-numbered scanning lines and the even low weight subfields b4, b2 being addressed to even-numbered scanning lines. See page 2, lines 4-6 of Appellant's Specification.

In a second method taught by Wani, two lines are addressed simultaneously with the same data.

Both of these methods result in a loss of signal quality due to a loss of resolution and/or sharpness. See page 2, lines 12-16 of Appellant's Specification.

Appellant improves upon these methods by grouping the lines differently in successive frames and/or different areas of the display, resulting in the desired reduction of the address period without an accompanying loss of resolution. See page 2, lines 29-31 of Appellant's Specification.

The Examiner relies on Kida to show the driving of two neighboring rows as one unit in a first field, and for shifting the rows in a second field.

Kida is concerned with the problem of how to process two different kinds of display signals on a single plasma display panel, an interlaced scan NTSC television signal for moving images, and a non-interlaced (progressive) scan computer monitor signal for stationary images. Kida solves this problem by converting the interlaced scan signal to a progressive scan signal. This is done by assigning the same luminance value to neighboring lines, and addressing these neighboring lines

together as a unit. For each subsequent frame, the unit is moved to the next line. This technique reduces the address period by half and avoids the need to increase the frame memory. See col. 7, lines 14-17.

Kida makes no distinction between subfields having most or least significant bits. In fact, applying Kida's technique to only some of the subfields would require an increase in the frame memory, and would not convert the interlaced scan signal to a progressive scan signal.

Thus, the skilled artisan would not be led by Kida to drive neighboring rows of only some of the subfields, i.e., the lower four bits of the Wani signal, at the same luminance value, and accordingly the combination of Wani and Kida fails to teach or suggest Appellant's claimed invention.

In response to Appellant's previous arguments and amendments, the Examiner stated, *inter alia*, that Wani teaches driving methods wherein the subfields representing the lower significant bits are displayed by interlace scanning, and wherein two lines are addressed simultaneously with the same data. This is true. However, in itself, these techniques, while reducing the addressing period and thus increasing the sustain period and consequently increasing the display brightness, result in a loss of resolution and/or sharpness. See, e.g., page 3, lines 9-14 of Appellant's specification.

Next, the Examiner urged that Kida assigns the same luminance value to neighboring lines. Wani's second technique also involves addressing neighboring lines simultaneously. See col. 2, lines 30-32. However, Wani applies this technique in a short scanning time (col. 2, line 29), meaning applying it to the least significant bits (col. 3, lines 34-36 and lines 51-58). On the other hand, does not distinguish between most

significant bits and least significant bits. Thus, the technique of Kida applies to the entire display signal, and accordingly would be expected to result in a much greater loss of resolution and/or sharpness than Wani's techniques.

Furthermore, the Examiner stated that Kida teaches 'light emitting periods for each of the sub-frames of one frame'. However, this teaching in itself suggests nothing with respect to how each of the sub-frames are treated or whether any of the sub-frames differ from one another.

Next, the Examiner stated that Wani teaches partial interlace scanning only in subfields corresponding to lower bits that have a shorter sustaining period and a small contribution to brightness. This is the first technique already described by Appellant, which results in a loss of resolution and/or sharpness, as compared to Appellant's technique.

Nevertheless, the Examiner urged that it would have been obvious to allow the lower bits to be driven with a common luminance value, thereby increasing the quality of the display.

However, nothing in either of the cited references teaches or suggests the result urged by the Examiner. As already explained, in failing to discriminate between most significant bits and least significant bits, Kida would actually result in greater degradation in picture quality than Wani.

It can only be with the aid of hindsight gained from Appellant's own teachings that the addressing of the same or average luminance date to adjacent lines of only the least significant subframes becomes obvious, and such hindsight is not permitted in judging obviousness under Section 103.

Moreover, Appellant's invention, as set forth in claim 1, is further characterized in that such addressing is

performed differently for (i) successive frames or fields and/or (ii) for different regions of the display device and/or (iii) for different subfields.

Accordingly, claims 1, 3, 5 and 8 are not obvious in view of the combination of Wani in view of Kida, and the rejection is in error and should be reversed.

2. Is claim 4 unpatentable under 35 USC 103(a) over Wani in view of Kida and further in view of Huang?

Claim 4 is rejected under 35 USC 103(a) over Wani in view of Kida and further in view of Huang.

Huang is concerned with the problem of dynamic false color contours in plasma display panels caused by similar color and brightness levels in successive frames. The successive frames are divided into subframes having different levels of significant bits, e.g., for 256 gray levels, 1:2:4:8:16:32:64:128. See para. [0006].

Huang offers the solution of dividing the scanning lines into groups having different orders in the full frame picture. E.g., 1:2:4:8:16:32:64:128 in a first group, and 128:64:32:16:8:4:2:1 in a second group. See para. [0010].

Huang does not teach or suggest applying a common luminance value to lines of a set of scanning lines of at least one of the least significant subfields, as claimed by Appellant's claim 1.

Thus, Huang adds no teachings to the combination of Wani and Kida which are relevant to the claimed invention. Accordingly, claim 4, which further restricts the scope of claim 1, is patentable over the combination of Wani, Kida and

Huang, and it is urged that the rejection is in error and should be withdrawn.

3. Is claim 6 unpatentable under 35 USC 103(a) over Wani in view of Kida and further in view of Nagai?

Claim 6 is rejected under 35 USC 103(a) over Wani in view of Kida and further in view of Nagai.

Like Huang, Nagi relates to the driving of plasma display devices. Nagi divides the matrix into first and second groups of electrodes arranged in parallel with each other, and pairs electrodes from the two groups. The prescribed discharge in the electrode pair groups is generated in units of the electrode pair groups at staggered timing.

This is said to accomplish a reduction in the peak current in the discharge as compared with the peak current in the conventional driving method simultaneously generating discharge in the overall pairs of electrodes or on the full screen of the plasma display panel, making it possible to reduce a substantial peak current flowing in each driver circuit connected to each of the first and second electrodes for supplying a prescribed driving voltage or voltage pulse to the electrodes, and in turn, make it is possible to implement miniaturization of each driver circuit, cost reduction and reduction of power consumption.

Nagi also teaches that his method of driving a plasma display panel can be applied to each of a plurality of subfields.

Nagi does not teach or suggest applying a common luminance value to lines of a set of scanning lines of at least

one of the least significant subfields, as claimed by Appellant's claim 1.

Thus, Nagi adds no teachings to the combination of Wani and Kida which are relevant to the claimed invention. Accordingly, claim 6, which further restricts the scope of claim 1, is patentable over the combination of Wani, Kida and Huang, and it is urged that the rejection is in error and should be withdrawn.

4. Is claim 7 unpatentable under 35 USC 103(a) over Wani in view of Kida and further in view of Prince?

Claim 7 is rejected under 35 USC 103(a) over Wani in view of Kida and further in view of Prince.

Prince discloses an addressing method and apparatus for increasing the selection ratio of an rms-responding, liquid crystal display by grouping together adjacent row electrodes and applying the same row addressing signal to each of the electrodes in a particular group. The grouping of the row electrodes typically changes cyclically for subsequent addressing cycles.

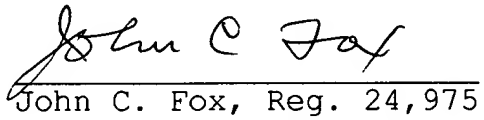
Prince makes clear that addressing cycles apply to fields or frames of information. Prince does not teach or suggest that these fields or frames are or may be divided into subfields or subframes of varying significance.

Thus, Prince is no more relevant to Appellant's claimed invention than Kida, which together with Wani, fails to teach or suggest the invention claimed by Claim 1, for the reasons already stated. It is therefore urged that the rejection of claim 7, which further restricts the scope of claim 1, is also in error and should be withdrawn.

CONCLUSION

It has been shown that the claimed invention distinguishes patentably over the teachings of the prior art references as applied in each of the rejections of claims under 35 USC 103(a). Accordingly, it is urged that each of the rejections is in error, and Appellant respectfully requests that the Board reverse the Examiner's final rejection and direct that the Application proceed to Issue.

Respectfully submitted,



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APPENDIX A

CLAIMS ON APPEAL

1. (amended) A method of displaying successive image frames or fields on a subfield driven matrix display device comprising display lines being addressed in sets of adjacent lines, said image frames or fields having original luminance value data being coded in subfields comprising a group of most significant subfields and a group of least significant subfields, a common luminance value data being supplied to lines of a set of said sets of lines of at least one of the least significant subfields,
characterized in that said addressing in sets of adjacent lines of the at least one of the least significant subfields is performed differently for (i) successive frames or fields and/or (ii) for different regions of the display device and/or (iii) for different subfields.

2. (original) A method as claimed in claim 1, characterized in that said common luminance value data for said at least one of the least significant subfields is obtained by averaging the corresponding least significant subfield original luminance value data of said set of lines.

3. (original) A method as claimed in claim 1, characterized in that said sets of lines comprise sets of two lines.

4. (original) A method as claimed in claim 1, characterized in that said sets of lines comprise sets of three lines.

5. (original) A method as claimed in claim 1, characterized in that said sets of adjacent lines comprise sets of lines having the same number of lines, said sets being shifted by one or more lines in each successive frame.

6. (original) A method as claimed in claim 1, characterized in that said display device comprises a first region being the upper half of the display and a second region being the lower half of the display.

7. (original) A method as claimed in claim 1, characterized in that said grouping of lines for each successive frame or field and for different regions of the display device is performed in a random manner.

8. (original) A display apparatus comprising a subfield driven display device for displaying successive image frames or fields on display lines, said image frames or fields having original luminance value data being coded in subfields comprising a group of most significant subfields and a group of least significant subfields, the display apparatus further comprising means for addressing the display device in sets of adjacent lines, and means for supplying a common luminance value data to lines of a set of said set of lines, characterized in that the display apparatus comprises means for selecting different sets of adjacent lines for:

(i) successive frames or fields, and/or

(ii) for different regions of the display device, and/or

(iii) for different subfields.